

Cable Connection Device And Method

Background Of The Invention

The present invention relates to a device with the capability of allowing electronic circuits to
5 be easily fitted to pre-existing electrical cables. The device utilises a method of facilitating
good electrical and mechanical contact with electrical cables, without any need for alteration
of the electrical cables, and for retention of the cables in position. In particular, the present
invention relates to such a device which is quickly and easily snap-fitted to the cable(s).

10 Description Of The Prior Art

In the field of automotive power electronics, devices for monitoring and control of electrical
characteristics, such as voltage levels, of the power circuitry are presently provided pre-
attached to the electronic cabling to be used in the automotive application.

15 For example, charging leads for charging or obtaining charge from a power source are
available with integrally formed electronic circuitry having the function of preventing surges
in electronic variables, such as voltage fluctuations, which can occur when current passes
from a voltage source. This can occur in situations such as using charging cables to charge
the battery of a motor vehicle.

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Certain electronic variable monitoring, such as current, voltage and power signals and levels,
is presently available as a transportable diagnostic device for pre-existing cabling. These
devices usually comprise a sharp metallic point which when pushed through cable insulation
provides electrical contact with the conducting core of the electrical cable. These devices
25 offer no permanent electronic monitoring, control or protection capabilities, but rather serve
as a 'trouble-shooting' diagnostic.

This identifies a need for a device that may be used to easily attach an arbitrary electronic
circuit to a wide range of pre-existing cables, either permanently or temporarily.

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Summary Of The Invention

The present invention seeks to provide a casing for an electronic circuit such that the casing assists in making stable electrical contact between the electronic circuitry integrally formed within the casing and the electrical cables to be monitored or controlled.

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The present invention seeks to provide a casing for housing an electronic circuit, said casing characterised in that it includes at least one cable connection means to secure said casing to a cable. Preferably said cable connection means is formed by a hinged wing adapted to close substantially about said cable. Also preferably said cable connection means includes at least one conductive spike adapted to pierce the insulative sheath of said cable. In use, when said cable is positioned within said cable connection means and said hinged wing is closed therearound, said insulative sheath of said cable is pierced by said conductive spike(s) to facilitate an electrical connection between said cable and said electronic circuit.

15 In one broad form the present invention provides a device to facilitate electrical connections to a cable, wire or the like, said device including:

a housing having a hinged or otherwise movable covering; and,

at least one conductive spike provided substantially within said housing;

such that, in use, a portion of said cable or wire is positioned proximal to said spike(s)

20 and said movable covering is closed to substantially surround said portion of said cable or wire, whereby said spike(s) is/are retained in electrical connection with said cable or wire.

Preferably, said cable, wire or the like includes an insulative sheath therearound whereby, in use, said spike(s), pierce(s) said insulative sheath and contacts said wire or cable.

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Also preferably, said housing has retaining means associated therewith to permanently or removably retain said housing in a closed position about said cable or wire.

In this preferred form, said retaining means includes locking pins and locking pin receptors.

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Preferably, said housing further includes support means to urge said cable or wire in a direction towards said spike(s).

In this form, preferably, said support means includes biased projecting members.

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Perhaps most preferably, said projecting members are integrally formed with said casing and are adapted to project in a substantially transverse direction to the axial direction of said cable.

10 In a preferred form, said projecting members have shaped ends adapted to at least partially surround said cable or wire.

Also preferably, the device is embodied, wherein two or more sets of projecting members are provided for retention of cables of varying diameter in said housing, each set of projecting
15 members including at least one member of different length.

In a most preferred form, said movable member is embodied in the form of a hinged wing.

Most preferably, two or more housings are provided, each for connection of a respective wire
20 or cable.

In a preferred embodiment, said device further includes an electrical circuit to be connected to said cable(s).

25 In a most preferred form, said housing(s) are formed of insulative, such as plastics, material.

In a further broad form, the present invention provides a device to facilitate electrical connection to a plurality of cables, wires or the like, said device including:

a housing having a plurality of hinged or otherwise movable coverings;
30 each having at least one conductive spike provided substantially within said housing;
such that, in use, a portion of one cable or wire is positioned proximal to a spike and

each movable covering is closed to substantially surround it's respective portion of cable or wire, whereby each spike is retained in electrical connection with its' respective cable or wire.

- 5 In this preferred form, the device preferably further includes an electrical circuit for connection to each of said plurality of cables.

In yet still a further broad form, the present invention provides a device to facilitate electrical connection to a pair of cables, wires or the like, said device including:

- 10 a housing having a pair of hinged wing members, each adapted to be closed about a respective cable or wire in a permanent or removable manner; and,
at least one conductive spike associated in each housing;
such that, in use, a portion of a cable or wire is positioned proximal to said spike(s) associated with a respective housing, and each hinged wing member is closed to surround said
15 respective portion of cable, whereby said spike(s) is/are retained in electrical connection with said cable or wire.

In this form, preferably, said housing further includes an electrical circuit for connection to each of said cables or wires.

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Brief Description Of The Drawings

The present invention will become more fully understood from the following detailed description of a preferred but non-limiting embodiment thereof, described in connection with the accompanying drawings, wherein:

- 25 Fig. 1 illustrates various views of a preferred embodiment of the present invention, and shows the lower half of the device;

Fig. 2 illustrates various views of a preferred embodiment of the present invention, and shows the upper half of the device;

- Fig. 3 illustrates a preferred embodiment of the present invention, and shows an
30 sectional view of the assembled device; and,

Fig. 4 illustrates end views of the assembled device.

Detailed Description Of A Preferred Embodiment

Throughout the drawings, like numerals will be used to identify similar features, except where expressly otherwise indicated.

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A preferred embodiment of the present invention is shown in Figs. 1, 2 and 3. In this embodiment the present invention provides a moulded plastic casing 1 which houses a printed circuit board 9 together with appropriate electronic components. For example, the casing 1 may house the voltage monitoring and control electronic circuit disclosed in the Applicant's
10 Australian Patent No. 620091.

Fig. 1 shows the lower half of the casing 1. Fig. 1(a) showing an elevational view, Fig. 1(b) showing a plan view, Fig. 1(c) showing a bottom view, and, Fig. 1(d) showing an end elevational view of a 'wing' of the device. The upper half 6 of the casing 1 is presented in
15 Fig. 2, with Fig. 2(a) showing a side elevational view, Fig. 2(b) showing a top view, Fig. 2(c) showing a plan view and Fig. 2(d) showing a front elevational view. Connecting these halves together forms the device, shown in sectional view in Fig. 3, and as illustrated in Fig. 4, Fig. 4(a) showing a side elevational view with the 'wings' open and Fig. 4(b) showing a side elevational view with the 'wings' closed.

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Each 'wing' 11 of the casing pivots along the hinge means 12 such that when the wing 11 is closed, as per the position illustrated in Fig. 3, an electrical cable or wire may be permanently or removably clamped therein.

25 Locking pins 4 in conjunction with the locking pin receptors 7 embody the retaining means to fix the flexible wings 11 into place so as the device remains clamped to an electrical cable. Underneath the locking pin receptors are provided a support means, embodied as tapered webs which provide mechanical support for the locking pin receptors and also help guide the electronic cable into a central position over the electronic connector spikes 10, ensuring they
30 make and maintain good contact with the conductive core of the electrical cabling when the wings 11 are closed.

The protrusions or biased projection means 2 and 3 embody the 'support means' for mechanical clamping of the device to electrical cable. These protrusions extend from the surface of the casing and physically push the cable onto the spiked electrical contacts 10 of the electronic circuit board 9. The protrusions 2 are typically for use in clamping cables of less than, say 12 mm, outer diameter, whilst the protrusions 3 aid in clamping cables with an outer diameter of greater than, say 4 mm. For small outer diameter cables, grommets may be supplied into the arches 5 and help hold the cables in position.

- 10 The protrusions 3, of which four are present in this embodiment, are preferably manufactured to bend at their base so as to provide a clamping force due to relaxing of the distorted moulded plastic. Bending of the protrusions 3 also allows the protrusions 2 to clamp larger outer diameter cables.
- 15 An orifice 8 in the upper half of the device allows viewing of an LED located on the electronic circuit board that may typically indicates the status of certain electronic variables. Obviously, the casing may be varied to contain other circuits and show other displays.

It will be understood that, whilst a very specific embodiment has been described, numerous other variations and modifications of the invention will become apparent to persons skilled in the art. All such variations and modifications should be considered to fall within the scope of the invention as broadly hereinbefore described and as hereinafter claimed.

THE CLAIMS

1. A device to facilitate electrical connections to a cable, wire or the like, said device including:

a housing having a hinged or otherwise movable covering; and,

5 at least one conductive spike provided substantially within said housing;

such that, in use, a portion of said cable or wire is positioned proximal to said spike(s) and said movable covering is closed to substantially surround said portion of said cable or wire, whereby said spike(s) is/are retained in electrical connection with said cable or wire.

10 2. A device as claimed in claim 1, wherein said cable, wire or the like includes an insulative sheath therearound whereby, in use, said spike(s), pierce(s) said insulative sheath and contacts said wire or cable.

3. A device as claimed in claim 1 or 2, wherein said housing has retaining means
15 associated therewith to permanently or removably retain said housing in a closed position about said cable or wire.

4. A device as claimed in claim 3, wherein said retaining means includes locking pins and locking pin receptors.

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5. A device as claimed in any one of claims 1 to 4, wherein said housing further includes support means to urge said cable or wire in a direction towards said spike(s).

6. A device as claimed in claim 5, wherein said support means includes biased projecting
25 members.

7. A device as claimed in claim 6, wherein said projecting members are integrally formed with said casing and are adapted to project in a substantially transverse direction to the axial direction of said cable.

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8. A device as claimed in claims 6 or 7, wherein said projecting members have shaped ends adapted to at least partially surround said cable or wire.

9. A device as claimed in any one of claims 6 to 8, wherein two or more sets of
5 projecting members are provided for retention of cables of varying diameter in said housing, each set of projecting members including at least one member of different length.

10. A device as claimed in any one of claims 1 to 9, wherein said movable member is embodied in the form of a hinged wing.

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11. A device as claimed in any one of claims 1 to 10, wherein two or more housings are provided, each for connection of a respective wire or cable.

12. A device as claimed in any of claims 1 to 11, wherein said device further includes an
15 electrical circuit to be connected to said cable(s).

13. A device as claimed in any one of claims 1 to 12, wherein said housing(s) are formed of insulative, such as plastics, material.

20 14. A device to facilitate electrical connection to a plurality of cables, wires or the like, said device including:

a housing having a plurality of hinged or otherwise movable coverings;
each having at least one conductive spike provided substantially within said housing;
such that, in use, a portion of one cable or wire is positioned proximal to a spike and
25 each movable covering is closed to substantially surround it's respective portion of cable or wire, whereby each spike is retained in electrical connection with its' respective cable or wire.

15. A device as claimed in claim 14, further including an electrical circuit for connection
30 to each of said plurality of cables.

16. A device to facilitate electrical connection to a pair of cables, wires or the like, said device including:

a housing having a pair of hinged wing members, each adapted to be closed about a respective cable or wire in a permanent or removable manner; and,

5 at least one conductive spike associated in each housing;

such that, in use, a portion of a cable or wire is positioned proximal to said spike(s) associated with a respective housing, and each hinged wing member is closed to surround said respective portion of cable, whereby said spike(s) is/are retained in electrical connection with said cable or wire.

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17. A device as claimed in claim 16, wherein said housing further includes an electrical circuit for connection to each of said cables or wires.

18. A device, substantially as herein described with reference to the accompanying
15 drawings.

19. A method of facilitating electrical connection to at least one cable, wire, or the like substantially as herein described.

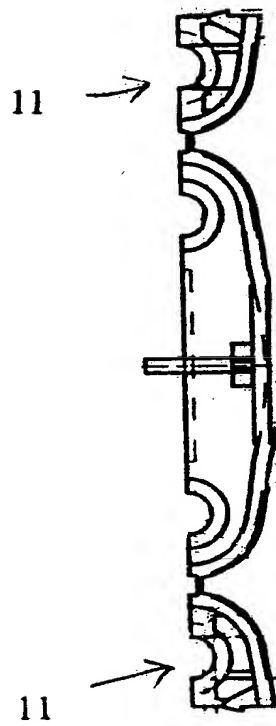


FIG. 1(a)

← 1

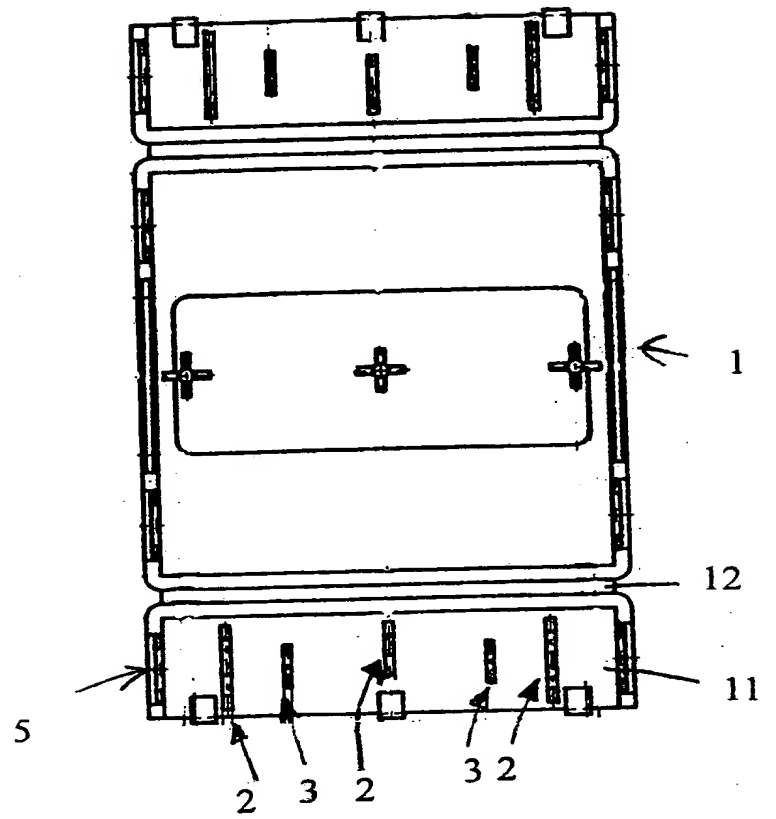


FIG. 1(b)

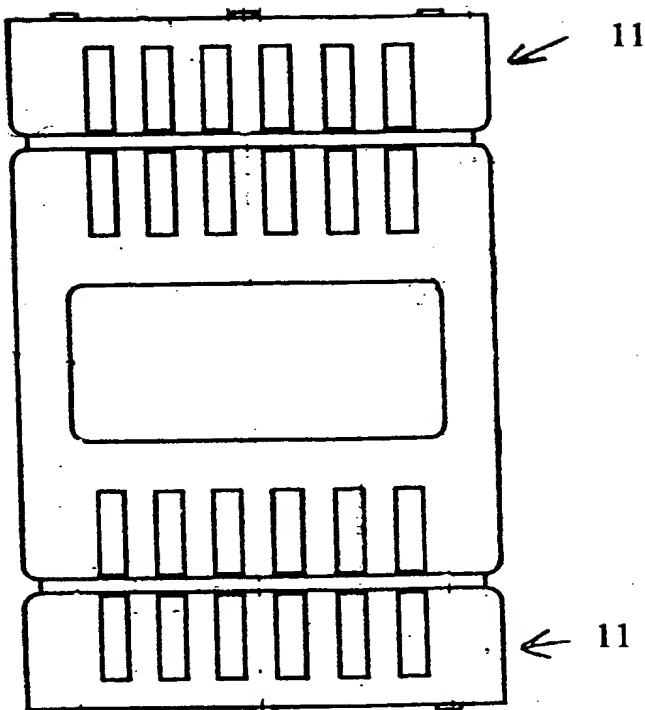


FIG. 1(c)



FIG. 1(d)

2/4

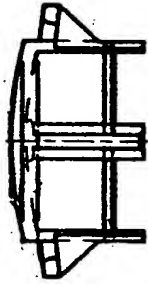


FIG. 2(a)

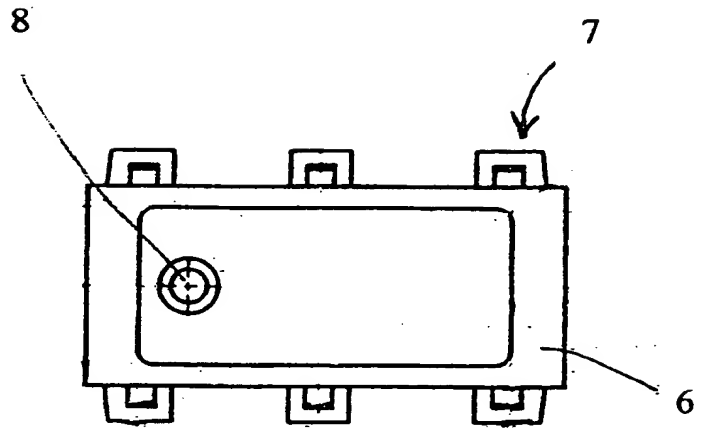


FIG. 2(b)

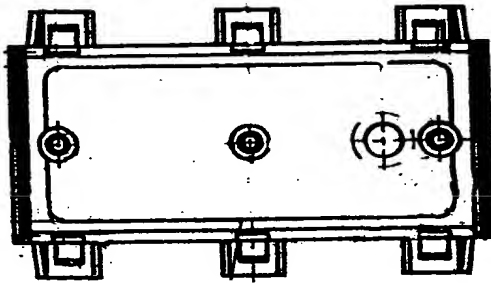


FIG. 2(c)

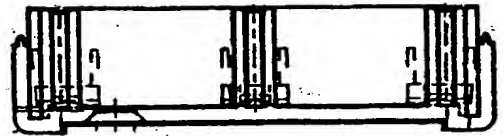


FIG. 2(d)

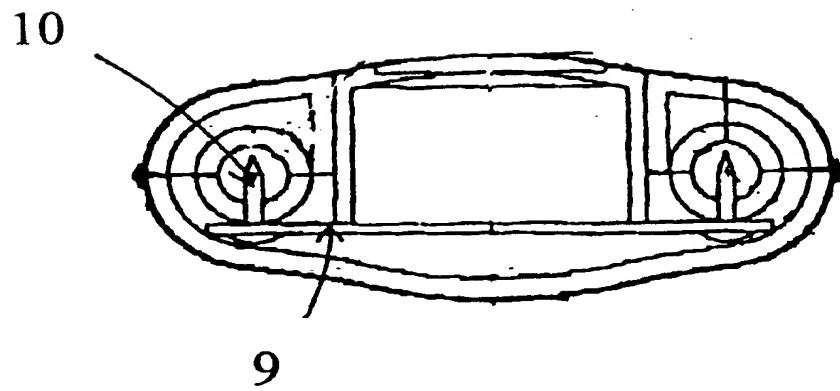


FIG. 3

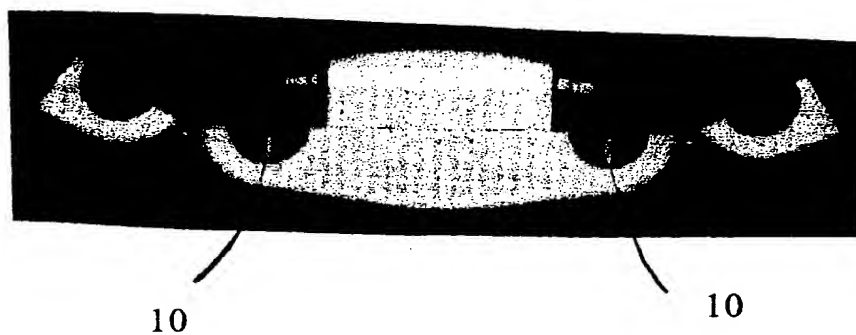


FIG. 4(b)

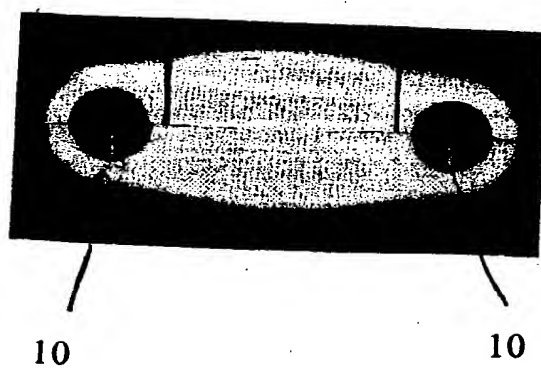


FIG. 4(a)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 99/00382

A. CLASSIFICATION OF SUBJECT MATTER				
Int Cl ⁶ : H01R 4/24, 43/01				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols) IPC: H01R 4/24 IC, H01R 43/01 IC				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU: IPC as above				
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT: IPC + Key words				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	EP 0528574 A2 (HOZELOCK LTD) 24 February 1993 Whole document	Claims 1-19		
X	US 4708414 A (LAM) 24 November 1987 Whole document	Claims 1-19		
X	GB 1591586 A (SUTTON-VANE) 24 June 1981 Whole document	Claims 1-19		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width: 50%; vertical-align: top;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p> </td> </tr> </table>			<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search 22 July 1999		Date of mailing of the international search report - 2 AUG 1999		
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INTERNATIONAL SEARCH REPORT

international application No.

PCT/AU 99/00382

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0073098 A1 (AMP INCORPORATED) 2 March 1983 Whole document	1-19
X	AU 34662/71 B (445957) (THOMAS & BETTS CORPORATION) 19 April 1973 Whole document	1-19
X	AU 42391/64 B (283798) (INSUL-8 CORP.) 23 September 1965 Whole document	1-19
X	EP 0356025 A1 (AMP INCORPORATED) 28 February 1990 Whole document	1-19
X	EP 0011923 A1 (AMP INCORPORATED) 11 June 1980 Whole document	1-19
X	US 4759722 A (SONG) 26 July 1988 Abstract, Fig 1-2	1-19
X	AU 18936/97 A (POUYET S. A.) 6 November 1997 Abstract, figs 1-4	1-19

Information on patent family members

International application No.

PCT/AU 99/00382

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
EP	0073098	US	4426125	BR	8204346	JP	58034583
		MY	72/88	US	4455058	US	4341430
AU	34662/71	BE	774354	CA	939032	DE	2150732
		GB	1371208	NL	7114759	US	3728665
EP	356025	CA	1310087	JP	2114467	US	5041009
		CA	1291234	EP	331688	US	4781615
		WO	8902165				
EP	0011923	CA	1106015	ES	486192	HK	812/86
		JP	55072373	US	4209219		
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PCT

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(PCT Rule 61.2)

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To:

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United States Patent and Trademark
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Date of mailing (day/month/year) 29 November 1999 (29.11.99)	
International application No. PCT/AU99/00382	Applicant's or agent's file reference 730152/AJC
International filing date (day/month/year) 20 May 1999 (20.05.99)	Priority date (day/month/year) 20 May 1998 (20.05.98)
Applicant MATHIESON, Brian, Douglas et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

10 November 1999 (10.11.99)

☐ in a notice effecting later election filed with the International Bureau on:
2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

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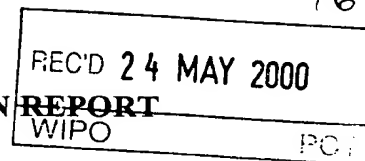
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S. Mafla

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16

PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)



Applicant's or agent's file reference 730152/AJC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International application No. PCT/AU 99/00382	International filing date (day/month/year) 20 May 1999	Priority Date (day/month/year) 20 May 1998
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ H01R 4/24, 43/01		
Applicant MATSON AUTOMOTIVE INDUSTRIES PTY LTD et al		

1.	This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.																
2.	<p>This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheet(s).</p>																
3.	<p>This report contains indications relating to the following items:</p> <table border="0"> <tr> <td>I</td> <td><input checked="" type="checkbox"/> Basis of the report</td> </tr> <tr> <td>II</td> <td><input type="checkbox"/> Priority</td> </tr> <tr> <td>III</td> <td><input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td>IV</td> <td><input type="checkbox"/> Lack of unity of invention</td> </tr> <tr> <td>V</td> <td><input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td>VI</td> <td><input type="checkbox"/> Certain documents cited</td> </tr> <tr> <td>VII</td> <td><input checked="" type="checkbox"/> Certain defects in the international application</td> </tr> <tr> <td>VIII</td> <td><input type="checkbox"/> Certain observations on the international application</td> </tr> </table>	I	<input checked="" type="checkbox"/> Basis of the report	II	<input type="checkbox"/> Priority	III	<input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	IV	<input type="checkbox"/> Lack of unity of invention	V	<input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	VI	<input type="checkbox"/> Certain documents cited	VII	<input checked="" type="checkbox"/> Certain defects in the international application	VIII	<input type="checkbox"/> Certain observations on the international application
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IV	<input type="checkbox"/> Lack of unity of invention																
V	<input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement																
VI	<input type="checkbox"/> Certain documents cited																
VII	<input checked="" type="checkbox"/> Certain defects in the international application																
VIII	<input type="checkbox"/> Certain observations on the international application																

Date of submission of the demand 10 November 1999	Date of completion of the report 01 May 2000
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer SOOSA GNANASINGHAM Telephone No. (02) 6283 2172

I. Basis of the report**1. With regard to the elements of the international application:***

- ☒ the international application as originally filed.
- ☐ the description, pages , as originally filed,
 pages , filed with the demand,
 pages , received on with the letter of .
- ☐ the claims, pages , as originally filed,
 pages , as amended (together with any statement) under Article 19,
 pages , filed with the demand,
 pages , received on with the letter of .
- ☐ the drawings, pages , as originally filed,
 pages , filed with the demand,
 pages , received on with the letter of .
- ☐ the sequence listing part of the description:
 pages , as originally filed
 pages , filed with the demand
 pages , received on with the letter of .

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, was on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	YES
	Claims 1-19	NO
Inventive step (IS)	Claims	YES
	Claims 1-19	NO
Industrial applicability (IA)	Claims 1-19	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

NOVELTY (N) Claims 1-19

- a) EP 0528574 A
- b) US 4708414 A
- c) GB 1591586 A
- d) EP 0073098 A
- e) AU 34662/71 B
- f) AU 42391/64 B
- g) EP 0356025 A
- h) EP 0011923 A
- i) US 4759722 A
- j) AU 18936/97 A

Each of the above citations a) - j) discloses all of the features of claims 1, 14 and 16. For example in citation a) see the housing (16), conductive spike (30) and hinged/movable covering (12), cable (20) in Figs 1-2. The appended claims 2-13, 15, and 17-19 define features which are either identifiable in the citations or they are variations which a person skilled in the art is expected to make. Claims 1-19 are therefore not novel.

INVENTIVE STEP (IS) Claims 1-19

As per novelty.

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims 18 and 19 refer to the description/drawings and therefore contravene Rule 6.2(a) of the PCT.

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF RECEIPT OF
RECORD COPY

(PCT Rule 24.2(a))

From the INTERNATIONAL BUREAU

To:

COWLE, Anthony, John
Davies Collison Cave
Level 10
10 Barrack Street
Sydney, NSW 2000
AUSTRALIE

Date of mailing (day/month/year) 06 July 1999 (06.07.99)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 730152/AJC	International application No. PCT/AU99/00382

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

MATSON AUTOMOTIVE INDUSTRIES PTY. LTD. (for all designated States except US)
MATHIESON, Brian, Douglas et al (for US)

International filing date : 20 May 1999 (20.05.99)
Priority date(s) claimed : 20 May 1998 (20.05.98)
Date of receipt of the record copy
by the International Bureau : 15 June 1999 (15.06.99)
List of designated Offices :

AP : GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW

EA : AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

EP : AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE

OA : BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

National : AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE,
GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX,
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW

ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application, the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to:



time limits for entry into the national phase



confirmation of precautionary designations



requirements regarding priority documents

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:

H. Zhou

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

COWLE, Anthony, John
Davies Collison Cave
Level 10
10 Barrack Street
Sydney, NSW 2000
AUSTRALIE

Date of mailing (day/month/year) 14 July 1999 (14.07.99)	
Applicant's or agent's file reference 730152/AJC	IMPORTANT NOTIFICATION
International application No. PCT/AU99/00382	International filing date (day/month/year) 20 May 1999 (20.05.99)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 20 May 1998 (20.05.98)
Applicant MATSON AUTOMOTIVE INDUSTRIES PTY LTD et al	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk(*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
20 May 1998 (20.05.98)	PP 3606	AU	16 June 1999 (16.06.99)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

H. Zhou

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

WO 99/60668
PCT/AU99/00382

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

COWLE, Anthony, John
Davies Collison Cave
Level 10
10 Barrack Street
Sydney, NSW 2000
AUSTRALIE

Date of mailing (day/month/year) 25 November 1999 (25.11.99)		IMPORTANT NOTICE	
Applicant's or agent's file reference 730152/AJC			
International application No. PCT/AU99/00382	International filing date (day/month/year) 20 May 1999 (20.05.99)	Priority date (day/month/year) 20 May 1998 (20.05.98)	
Applicant MATSON AUTOMOTIVE INDUSTRIES PTY. LTD. et al			

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
AU,CN,EP,IL,JP,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CU,CZ,DE,DK,EA,EE,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MD,MG,MK,MN,MW,MX,NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,UA,UG,UZ,VN,YU,ZA,ZW
The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
25 November 1999 (25.11.99) under No. WO 99/60668

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a **demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. (41-22) 740.14.35</p>	<p>Authorized officer J. Zahra</p> <p>Telephone No. (41-22) 338.83.38</p>
---	--

PATENT COOPERATION TREATY

PCT

INFORMATION CONCERNING ELECTED OFFICES NOTIFIED OF THEIR ELECTION

(PCT Rule 61.3)

From the INTERNATIONAL BUREAU

To:

COWLE, Anthony, John
Davies Collison Cave
Level 10
10 Barrack Street
Sydney, NSW 2000
AUSTRALIE

Date of mailing (day/month/year) 29 November 1999 (29.11.99)		IMPORTANT INFORMATION	
Applicant's or agent's file reference 730152/AJC			
International application No. PCT/AU99/00382	International filing date (day/month/year) 20 May 1999 (20.05.99)	Priority date (day/month/year) 20 May 1998 (20.05.98)	
Applicant MATSON AUTOMOTIVE INDUSTRIES PTY. LTD. et al			

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

AP : GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW

EP : AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE

National : AU, BG, BR, CA, CN, CZ, DE, IL, JP, KP, KR, MN, NO, NZ, PL, RO, RU, SE, SK, US

2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

EA : AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

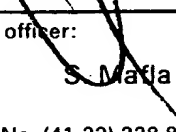
OA : BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

National : AE, AL, AM, AT, AZ, BA, BB, BY, CH, CU, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IN, IS, KE, KG, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MW, MX, PT, SD, SG, SI, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW

3. The applicant is reminded that he must enter the "national phase" **before the expiration of 30 months from the priority date** before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing, if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of any annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and the acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

The entry into the European regional phase is postponed until **31 months from the priority date** for all States designated for the purposes of obtaining a European patent.

<p style="text-align: center;">The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. (41-22) 740.14.35</p>	<p>Authorized officer:</p> <p style="text-align: center;"> S. Maña</p> <p>Telephone No. (41-22) 338.83.38</p>
---	---

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

DP (PASS) MAIL
RECEIVED

22 MAY 2000

PROCESSED BY... 1M...

ON 22 105 100

Receive IPE report 2200

Applicant's or agent's file reference 730152/AJC	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).	
International application No. PCT/AU 99/00382	International filing date (day/month/year) 20 May 1999	Priority Date (day/month/year) 20 May 1998
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ H01R 4/24, 43/01		
Applicant MATSON AUTOMOTIVE INDUSTRIES PTY LTD et al		

1.	This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.																
2.	<p>This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheet(s).</p>																
3.	<p>This report contains indications relating to the following items:</p> <table border="0"> <tr> <td>I</td> <td><input checked="" type="checkbox"/> Basis of the report</td> </tr> <tr> <td>II</td> <td><input type="checkbox"/> Priority</td> </tr> <tr> <td>III</td> <td><input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td>IV</td> <td><input type="checkbox"/> Lack of unity of invention</td> </tr> <tr> <td>V</td> <td><input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td>VI</td> <td><input type="checkbox"/> Certain documents cited</td> </tr> <tr> <td>VII</td> <td><input checked="" type="checkbox"/> Certain defects in the international application</td> </tr> <tr> <td>VIII</td> <td><input type="checkbox"/> Certain observations on the international application</td> </tr> </table>	I	<input checked="" type="checkbox"/> Basis of the report	II	<input type="checkbox"/> Priority	III	<input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	IV	<input type="checkbox"/> Lack of unity of invention	V	<input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	VI	<input type="checkbox"/> Certain documents cited	VII	<input checked="" type="checkbox"/> Certain defects in the international application	VIII	<input type="checkbox"/> Certain observations on the international application
I	<input checked="" type="checkbox"/> Basis of the report																
II	<input type="checkbox"/> Priority																
III	<input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability																
IV	<input type="checkbox"/> Lack of unity of invention																
V	<input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement																
VI	<input type="checkbox"/> Certain documents cited																
VII	<input checked="" type="checkbox"/> Certain defects in the international application																
VIII	<input type="checkbox"/> Certain observations on the international application																

Date of submission of the demand 10 November 1999	Date of completion of the report 01 May 2000
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200 WODEN ACT 2606 AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer SOOSA GNANASINGHAM Telephone No. (02) 6283 2172

I. Basis of the report**1. With regard to the elements of the international application:***

- ☒ the international application as originally filed.
- ☐ the description, pages , as originally filed,
 pages , filed with the demand,
 pages , received on with the letter of .
- ☐ the claims, pages , as originally filed,
 pages , as amended (together with any statement) under Article 19,
 pages , filed with the demand,
 pages , received on with the letter of .
- ☐ the drawings, pages , as originally filed,
 pages , filed with the demand,
 pages , received on with the letter of .
- ☐ the sequence listing part of the description:
 pages , as originally filed
 pages , filed with the demand
 pages , received on with the letter of .

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
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3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, was on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	YES
	Claims 1-19	NO
Inventive step (IS)	Claims	YES
	Claims 1-19	NO
Industrial applicability (IA)	Claims 1-19	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

NOVELTY (N) Claims 1-19

- a) EP 0528574 A
- b) US 4708414 A
- c) GB 1591586 A
- d) EP 0073098 A
- e) AU 34662/71 B
- f) AU 42391/64 B
- g) EP 0356025 A
- h) EP 0011923 A
- i) US 4759722 A
- j) AU 18936/97 A

Each of the above citations a) - j) discloses all of the features of claims 1, 14 and 16. For example in citation a) see the housing (16), conductive spike (30) and hinged/movable covering (12), cable (20) in Figs 1-2. The appended claims 2-13, 15, and 17-19 define features which are either identifiable in the citations or they are variations which a person skilled in the art is expected to make. Claims 1-19 are therefore not novel.

INVENTIVE STEP (IS) Claims 1-19

As per novelty.

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims 18 and 19 refer to the description/drawings and therefore contravene Rule 6.2(a) of the PCT.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 99/00382

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl⁶: H01R 4/24, 43/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: H01R 4/24 IC, H01R 43/01 IC

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPAT: IPC + Key words

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0528574 A2 (HOZELOCK LTD) 24 February 1993 Whole document	Claims 1-19
X	US 4708414 A (LAM) 24 November 1987 Whole document	Claims 1-19
X	GB 1591586 A (SUTTON-VANE) 24 June 1981 Whole document	Claims 1-19

☒ Further documents are listed in the continuation of Box C

☒ See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance
 "E" earlier application or patent but published on or after the international filing date
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 "O" document referring to an oral disclosure, use, exhibition or other means
 "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
 "&" document member of the same patent family

Date of the actual completion of the international search
22 July 1999

Date of mailing of the international search report
- 2 AUG 1999

Name and mailing address of the ISA/AU
AUSTRALIAN PATENT OFFICE
PO BOX 200
WODEN ACT 2606
AUSTRALIA
Facsimile No.: (02) 6285 3929

Authorized officer

SOOSA GNANASINGHAM
Telephone No.: (02) 6283 2172

INTERNATIONAL SEARCH REPORT

international application No.

PCT/AU 99/00382

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0073098 A1 (AMP INCORPORATED) 2 March 1983 Whole document	1-19
X	AU 34662/71 B (445957) (THOMAS & BETTS CORPORATION) 19 April 1973 Whole document	1-19
X	AU 42391/64 B (283798) (INSUL-8 CORP.) 23 September 1965 Whole document	1-19
X	EP 0356025 A1 (AMP INCORPORATED) 28 February 1990 Whole document	1-19
X	EP 0011923 A1 (AMP INCORPORATED) 11 June 1980 Whole document	1-19
X	US 4759722 A (SONG) 26 July 1988 Abstract, Fig 1-2	1-19
X	AU 18936/97 A (POUYET S. A.) 6 November 1997 Abstract, figs 1-4	1-19

Information on patent family members

PCT/AU 99/00382

Patent Document Cited in Search Report				Patent Family Member			
EP	0073098	US	4426125	BR	8204346	JP	58034583
		MY	72/88	US	4455058	US	4341430
AU	34662/71	BE	774354	CA	939032	DE	2150732
		GB	1371208	NL	7114759	US	3728665
EP	356025	CA	1310087	JP	2114467	US	5041009
		CA	1291234	EP	331688	US	4781615
		WO	8902165				
EP	0011923	CA	1106015	ES	486192	HK	812/86
		JP	55072373	US	4209219		
AU	18936/97	BR	9701922	CA	2203713	EP	805517
END OF ANNEX							